BERGHOF

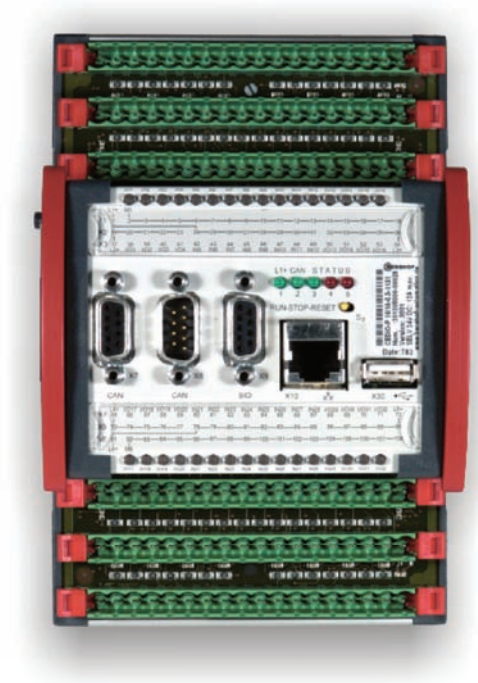
AUTOMATION

ZUNDEL Holding Enterprise

CEDIO-P

Cell Controller

V.1.0



User Handbook

CANtrol®

Your Automation Solution

Copyright © BERGHOF Automationstechnik GmbH

Reproduction and duplication of this document and utilisation and communication of its content is prohibited, unless with our express permission.
All rights reserved. Damages will be payable in case of infringement.

Disclaimer

The content of this publication was checked for compliance with the hardware and software described. However, discrepancies may arise, therefore no liability is assumed regarding complete compliance. The information in this document will be checked regularly and all necessary corrections will be included in subsequent editions. Suggestions for improvements are always welcome.

Subject to technical changes.

Trademark

CANtrol® // is a registered trademark of BERGHOFAutomationstechnik GmbH

General Information on this Manual

Content:
This manual describes the CANtrol module CEDIO-P and its modifications. The product-related information contained herein was up to date at the time of publication of this manual.

Completeness:
This manual is complete only in conjunction with the user manual entitled

‘Introduction
to CANtrol Automation System’

and the product-related hardware or software user manuals required for the particular application.

Standards:
The CANtrol automation system, its components and its use are based on International Standard IEC 61131 Parts 1 to 4 (EN 61131 Parts 1 to 3 and Supplementary Sheet 1).
Supplementary Sheet 1 of EN 61131 (IEC 61131-4) entitled ‘User Guidelines’ is of particular importance for the user.

Order numbers:
Please see the relevant product overview in the ‘Introduction to CANtrol Automation System’ manual for a list of available products and their order numbers.

Ident. No.: 2810420

You can reach us at:

BERGHOF Automationstechnik GmbH
Harretstr. 1
72800 Eningen / Germany
Phone: +49 7121 / 894-0
Telefax: +49 7121 / 894-100
e-mail: info@berghof-automation.de
www.berghof-automation.de

BERGHOFAutomationstechnik GmbH works in accordance with DIN EN ISO 9001

Update

Version	Date	Subject
1.0	17.04.07	First version

blank page

Contents

1. GENERAL INSTRUCTIONS 7

1.1. Hazard Categories and Indications 7

1.2. Qualified users 7

1.3. Use as Prescribed 8

2. CEDIO-P MODULE 9

2.1. Overview 9

2.2. Technical Specifications 10

2.3. Block Circuit Diagram 12

2.4. Module View and Connection Assignment 13

2.5. Subassembly Operation 14

2.5.1. Commissioning 14

2.5.2. Function Selection, Displays, Diagnostics 14

2.5.3. Serial Interfaces 15

2.5.4. Ethernet Interface 16

2.5.5. USB Interface 17

2.5.6. CAN Interfaces (Standard Design) 18

3. DIGITAL INPUTS/OUTPUTS (HIGH SIDE-/LOW SIDE SWITCHING) 19

3.1. Grouping of Inputs/Outputs 19

3.1.1. Schematic Diagram of Input/Output Grouping (high side-/low side switching) 20

3.1.2. Without Grouping (high side-/low side switching) 21

3.2. Digital Inputs, high side switching 22

3.2.1. Block diagram of input, high side switching 22

3.3. Digital Inputs, low side switching 23

3.3.1. Block diagram of input, low side switching 23

3.3.2. Digital Inputs Data (high side-/low side switching) 24

3.4. Digital Outputs, high side switching 26

3.4.1. Block diagram of output high side switching 26

3.5. Digital Outputs, low side switching 27

3.5.1. Block diagram of output low side switching 27

3.5.2. Digital Outputs Data (high side-/low side switching) 28

Overload Reaction of Digital Outputs (high side-/low side switching) 29

4. ANNEX 31

4.1. Environmental Protection 31

4.1.1. Emission 31

4.1.2. Disposal 31

4.2. Maintenance/Upkeep 31
4.3. Repairs/Service 31
4.3.1. Warranty 31
4.4. Nameplate 32
4.5. Addresses and Bibliography 34
4.5.1. Addresses 34
4.5.2. Standards/Bibliography 34

1. General Instructions

1.1. Hazard Categories and Indications

The indications described below are used in connection with safety instructions you will need to observe for your own personal safety and the avoidance of damage to property.

These instructions are emphasised by bordering and/or shading and a bold-printed indication, their meaning being as follows:

DANGER	**Immediate danger** Failure to observe the information indicated by this warning will result in death, serious injury or extensive property damage.
WARNING	**Potential danger** Failure to observe the information indicated by this warning may result in death, serious injury or extensive property damage.
CAUTION	**Danger** Failure to observe the information indicated by this warning may result in injury or property damage.
NOTICE	**No hazard** Information indicated in this manner provides additional notes concerning the product.

1.2. Qualified users

Qualified users within the meaning of the safety instructions in this documentation are trained specialists who are authorised to commission, earth and mark equipment, systems and circuits in accordance with safety engineering standards and who as project planners and designers are familiar with the safety concepts of automation engineering.

1.3. Use as Prescribed

This is a modular automation system based on the CANbus, intended for industrial control applications within the medium to high performance range.

The automation system is designed for use within Overvoltage Category I (IEC 364-4-443) for the controlling and regulating of machinery and industrial processes in low-voltage installations in which the rated supply voltage does not exceed 1,000 VAC (50/60 Hz) or 1,500 VDC.

Qualified project planning and design, proper transport, storage, installation, use and careful maintenance are essential to the flawless and safe operation of the automation system.

The automation system may only be used within the scope of the data and applications specified in the present documentation and associated user manuals.

The automation system is to be used only as follows:

- as prescribed,
- in technically flawless condition,
- without arbitrary or unauthorised changes and
- exclusively by qualified users

The regulations of the German professional and trade associations, the German technical supervisory board (TÜV), the VDE (Association of German electricians) or other corresponding national bodies are to be observed.

Safety-oriented (fail-safe) systems

Particular measures are required in connection with the use of SPC in safety-oriented systems. If an SPC is to be used in a safety-oriented system, the user ought to seek the full advice of the SPC manufacturer in addition to observing any standards or guidelines on safety installations which may be available.

⚠ WARNING	**As with any electronic control system, the failure of particular components may result in uncontrolled and/or unpredictable operation.** All types of failure and the associated fuse systems are to be taken into account at system level. The advice of the SPC manufacturer should be sought if necessary.

2. CEDIO-P Module

2.1. Overview

Order number The order/part no. is located on the nameplate of the individual modules for separate ordering.

Function The Cell Controller is a real-time-capable control module with a broad spectrum of I/O and data interfaces. The module can be programmed in “C” or in accordance with IEC 61131-3 (CoDeSys 2.3).

Ethernet An Ethernet interface operating at 10/100 MB/s is available. TCP/IP and UDP/IP protocols permit extremely flexible linkage to visualization software, higher-level control units or to the IT infrastructure.

USB The USB host interface offers a widely used peripheral device interface. It can be used, for example, in conjunction with a USB stick to carry out an application update or data download. Please contact our Technical Support staff is driver support is not available for a specific USB device.

CAN interfaces The Cell Controller is equipped with 2 standard CAN interfaces, both of which can be employed up to 1 MB/s.

Serial interfaces The programming interface (RS232) can also be used by the application.

Digital I/Os The module is equipped with 16 digital inputs and 16 digital inputs/outputs.

E-bus expansion The Cell Controller’s I/O E/A level can be expanded by up to a maximum of 6 digital E-bus extensions.

Overview of performance characteristics

- Motorola PowerPC 5200 CPU / 400 MHz
- Application program and data memory (RAM):
  64 MB on board; 32 MB for the application
- Application program memory (Flash):
  16 MB on board; 8 MB for the application
- Retain memory: 16 KB
- 1 Ethernet 10/100 interface
- 1 USB Host interface
- 2 CAN interfaces
- 1 serial RS232 interface for programming tools and application
- 16 digital inputs
- 16 digital, individually configurable inputs/outputs
- I/O level locally expandable via internal E-bus up to 6 expansion modules (digital / analog)
- Maintenance free due to lack of backup battery

Standard delivery The standard control module delivery comprises:

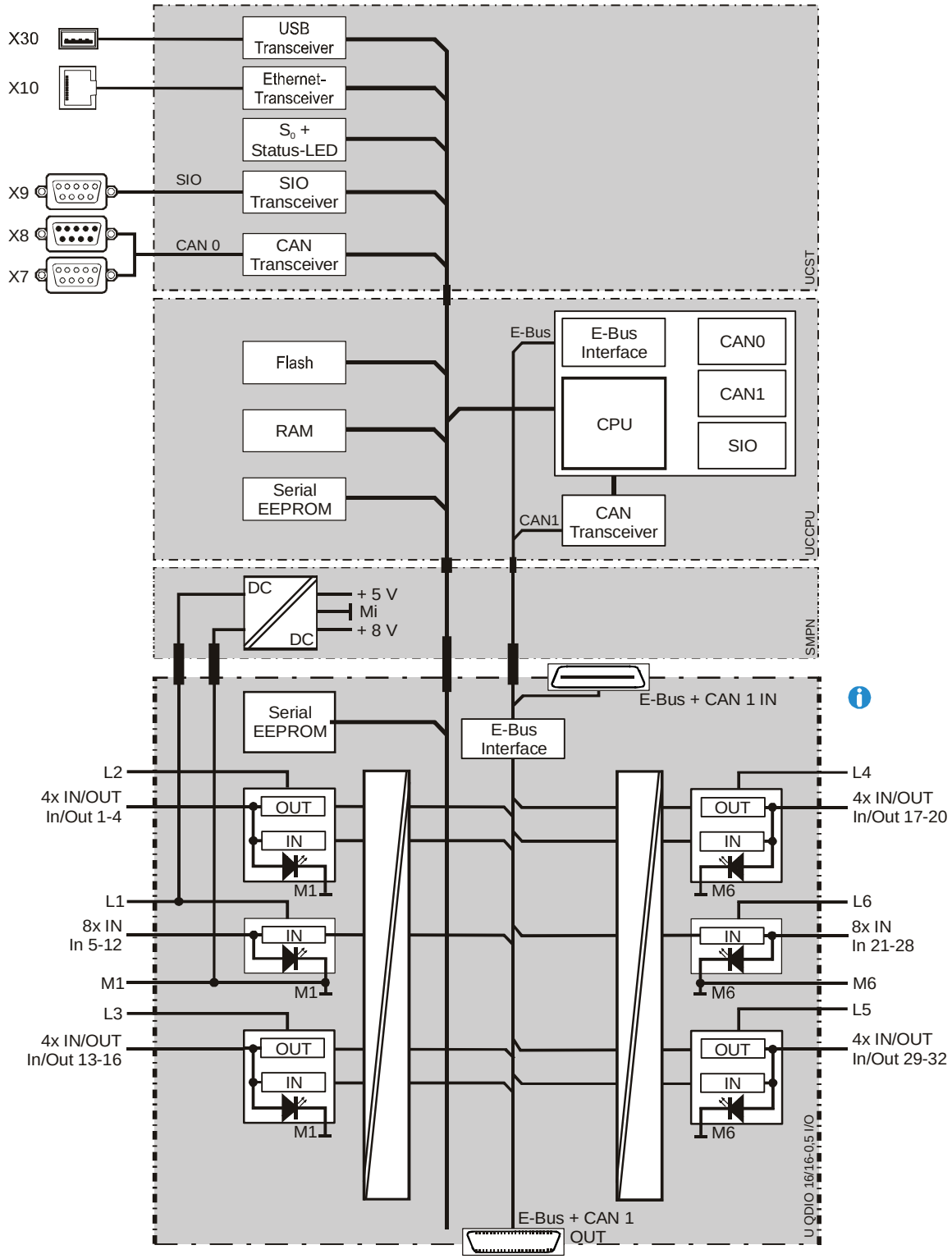
- CEDIO-P 16/16-0.5 control module

2.2. Technical Specifications

Module data		
Versions	CEDIO-P 16/16-0.5-1131	CEDIO-P 16/16-0.5
Part no.	201205000	201204000
Development environment	CP1131 (as of V2.3) or CPC++	
Dimensions, WxHxD [mm]	124 x 170 x 85.5 (in series dimensions W = 113/118.5)	
Weight	approx. 700 g	
Installation	Bearer rail, NS 35/7.5 EN 50022	
Expansion	With up to 6 E-bus expansion modules	
Operating temperature range	5° C to 50° C (non-condensing) convection cooling assured	
CPU	PPC 5200 / 400 MHz	
Programming software	IEC 61131-3 or high language “C” with real-time operating system	
Application memory		
Application program and data memory (RAM)	64 MB on board / 32 MB for the application	
Application program memory (Flash)	16 MB on board / 8 MB for the application	
Retain memory	16 KB	
EMI, protection class, insulation test, protection method		
Interference emission	EN 50081-2, industrial areas	
Interference resistance	EN 50082-2, industrial areas	
Protection class	III	
Insulation resistance	EN 61131-2; DC 500 V test voltage	
Protection method	IP 20	
Supply voltage, current consumption		
Power supply, module electronics (connection voltage)	SELV DC +24 V < 0.4 A (EN 61131-2)	
Power supply, digital I/Os	DC +24 V (EN 61131-2) divided into 3 groups	
Power consumption	At U_e= DC +24 V in neutral, a max. of 500 mA, Fuses, depending on the I/O loads: max. 10 A	
Supply voltage polarity reversal protection	Yes	
Potential isolation	Yes	
Digital inputs/outputs (DIO)		
Number of inputs	16	
Number of inputs/outputs	16	
Output current	0.5 A	
Short circuit protection	Yes	
Potential isolation	Yes	
Connection technique	Standing 3-wire front wiring with terminal strips for screw-on, crimping, terminals.	

Ethernet interface	
Number / type of interfaces	1 Ethernet 10/100 interface
Protocols	TCP/IP and UDP/IP
Connection technique	RJ45 (ETH, X10)
USB interface	
Number / type of interfaces	1 USB Host interface, V1.1 (X30)
Serial data interfaces	
Number / type of interfaces	1 RS232 (X9) for programming / application
CAN interfaces	
Number / type of interfaces	2 CAN ISO11898 CAN channel 0 (X7/X8) on the cover CAN channel 1 on the E-bus connector
Operating / display elements	
LEDs	5 status LEDs; 1 status LED per digital input/output (DIO) (not for the special timer inputs/outputs)
Operating mode selector switch	Yes, on the cover (S0)
Programming	Via Ethernet or RS232 port (X9)

2.3. Block Circuit Diagram

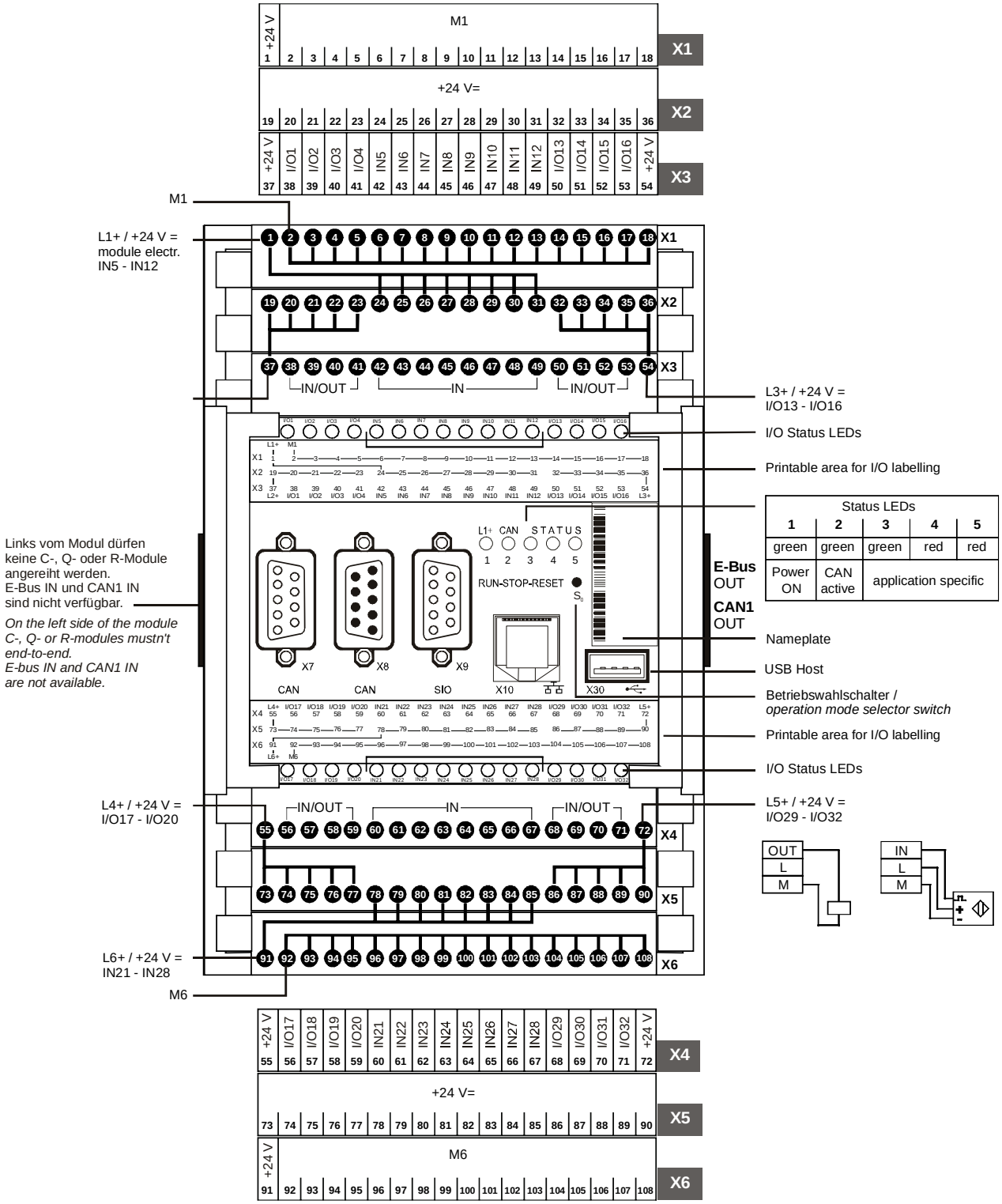


Hinweis: Links vom Modul dürfen keine C-, Q- oder R-Module angereiht werden. E-Bus IN und CAN1 IN sind nicht verfügbar.

Note: *On the left side of the module C-, Q- or R-modules mustn't end-to-end.E-bus IN and CAN1 IN are not available.*

2VF100299DG00.cdr

2.4. Module View and Connection Assignment



Status LEDs				
1	2	3	4	5
green	green	green	red	red
Power ON	CAN active	application specific		

2VF100300DG00.cdr

2.5. Subassembly Operation

WARNING

Do not connect, apply, disconnect, or touch connectors during operation!
This could result in destruction or incorrect function. Prior to any work on the modules, switch all feeds off including those from connected peripheral devices, separately powered actuators, programming devices, etc.

2.5.1. Commissioning

Before applying the supply voltage perform one last check of all connections to make sure they are wired correctly and have the correct polarity.
Switch the supply voltage on.

NOTICE

For more information, please refer to the associated software documentation.

2.5.2. Function Selection, Displays, Diagnostics

I/O status

Each input and output is assigned a yellow LED which indicates the logical state of the associated input or output.

I/O status

LED state		Logical state
Input LED	Yellow ON	1 (HIGH, activated)
Input LED	Yellow OFF	0 (LOW)
Output LED	Yellow ON	1 (HIGH, activated)
Output LED	Yellow OFF	0 (LOW)

Operating mode selector switch

Used to switch between operating modes and to restart the module. This function is software dependent.

Switch position	CP1131	CPC++
RUN (R)	CP1131 program in the RUN state; can be changed with the programming device.	Freely programmable
STOP (S)	CP1131 program in the STOP state	Freely programmable
RESET (F)	CP1131 program (in RAM) and the RETAIN variables will be deleted.	Freely programmable

Operating status

Five operating status LEDs provide information concerning the current state of the power supply, the module mode and other functions.
The status LEDs are also used to display error messages.

Operating status

LED state		Logical state	
1	L1+ (green)	ON =	Correct supply voltage to the module electronics
2	CAN status 2 (green)	ON =	CAN 0 send active

Operating status, CPC++

LEDs 3 to 5 can be controlled by the application software.

Operating status, CP1131

Status3 (green)	Status4 (red)	Status5 (red)	Description
Either	Either	On	At least one variable is force controlled (FORCE).
On	Off	Either	Application program in the RUN state.
Off	On	Either	Application program in the STOP state.
Off	Flashing	Either	Application program in the ERROR STOP state.
Flashing	On	Either	Application program in the breakpoint STOP state.

2.5.3. Serial Interfaces

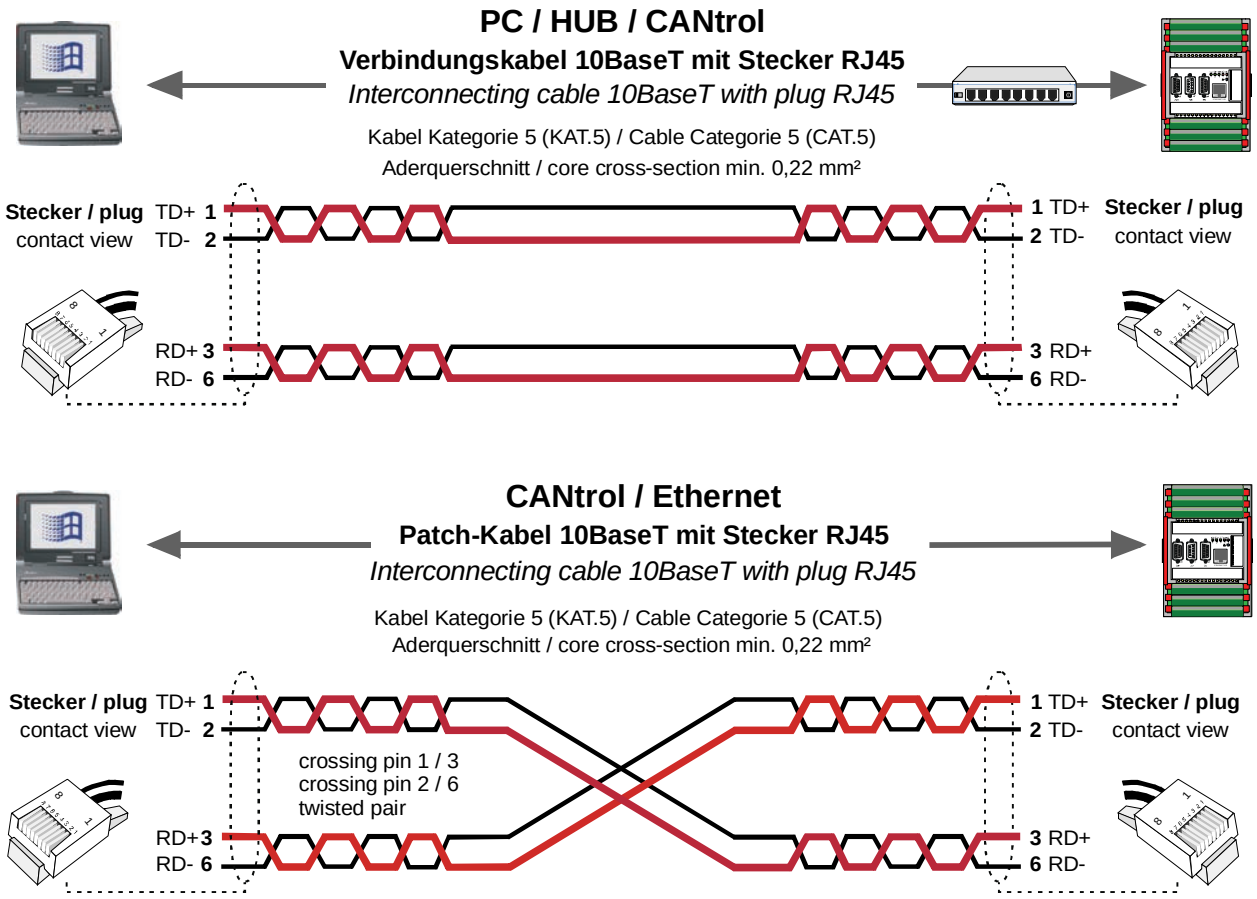
The module is equipped with a serial interface (RS232) which can be used for programming or for the application.

X9: RS232 programming interface

Pin	Signal	Description
1	Reserved	Do not connect
2	**RXD**	Received data
3	**TXD**	Transmitted data
4	Reserved	Do not connect
5	**GND**	Signal ground
6	Reserved	Do not connect
7	Reserved	Do not connect
8	Reserved	Do not connect

2.5.4. Ethernet Interface

An Ethernet interface operating at 10/100 MB/s is available. TCP/IP and UDP/IP protocols permit extremely flexible linkage to visualization software, higher-level control units or to the IT infrastructure.



2VF100238DG00.cdr

X10: **Ethernet pin assignment**

Pin	Signal	Description
1	TD+	
2	TD-	
3	RD+	
4	NC	Do not connect
5	NC	Do not connect
6	RD-	
7	NC	Do not connect
8	NC	Do not connect

2.5.5. USB Interface

Devices with USB connectors (x30) can be connected to the USB port (Rev. 1.1). This is a USB host interface which delivers up to 500 mA of current at +5V.

NOTICE

The subassembly power pack also supplies the electronics on the E-bus expansion modules. If more than 100 mA are required at the USB interface, the maximum number of E-bus subscribers is reduced.

Pin assignment

X30		
USB	B1	VCC
	B2	D-
	B3	D+
	B4	GND

The only USB devices classes which can be employed for CoDeSys users are USB sticks. A mouse can only be employed at the Linux level. The following points must be taken into consideration when USB sticks are employed:

CAUTION

A USB stick may only be pulled during operation if all file operations have been completed, otherwise the USB stick may become unusable!

If programs still have files open, the directory will no longer be able to be removed once the USB stick has been pulled. In this situation file or directory operations will result in blockages because information is to be read from a device that is no longer available in the system. Therefore, always make sure that no program still has open files in the USB stick before pulling the stick.

- USB memory sticks can be inserted and pulled during operation. The inserted device is automatically detected and mounted in the /media/usbX directory. When the USB stick is pulled, the associated /media/usbX directory automatically “disappears” provided no program is currently accessing it (see above).
- Either the first partition or, if there are no partitions, the entire memory will be mounted on the memory stick, in other words, the associated directory appears automatically.
- The first stick is mounted under /media/usb0, the second under /media/usb1, and so on. A maximum of 8 sticks may be inserted simultaneously (/media/usb[0-7]). If a new (or previously inserted, then pulled) stick is inserted it will be placed on the directory with the lowest number. Connecting a USB hub allows multiple sticks to be operated at a given USB interface. Care must be taken that no USB devices are still inserted in the hub when the hub is itself inserted or pulled.

NOTICE

The mechanical structure of the USB port is designed for a maximum insertion cycles.

2.5.6. CAN Interfaces (Standard Design)

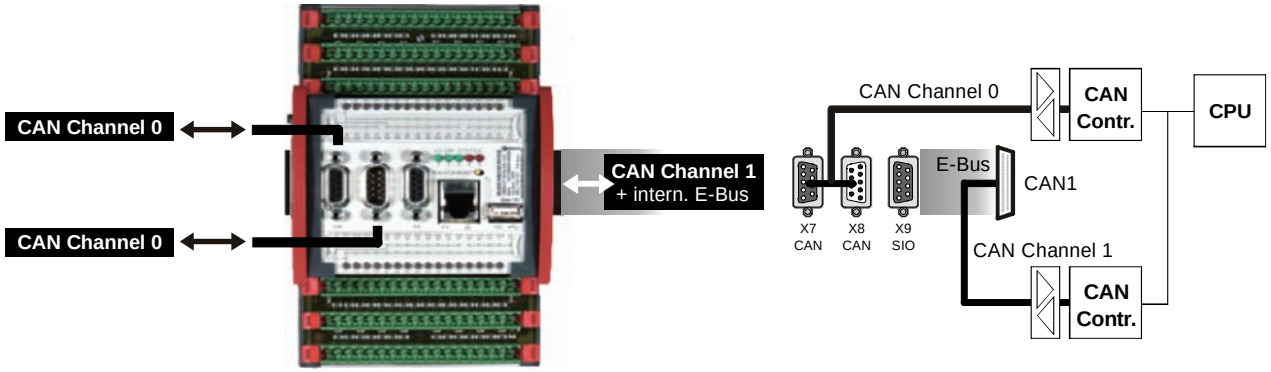
The CPU module is equipped with a total of 2 CAN interfaces with CAN bus voltage levels in accordance with ISO/DIS11898.
The standard CAN interfaces correspond to the description contained in the manual, *"Introduction to CANtrol Automation Systems".*

CAN channel 0

X7/X8 on the front face
Aside from its duty as an application-specific communications interface, channel 0 also serves as the programming interface.
The max. baud rate is 1 MB/s and can be adjusted by software.

CAN channel 1

The second CAN interface (channel 1) is located on the E-bus plug-in connector on the side of the unit. This interface is equipped with a CAN terminal resistor.
The max. baud rate is 1 MB/s and can be adjusted by software.



2VF100298DG00.cdr

X7 / X8: **Pin assignment**

Pin	Signal	Description
1	Reserved	Do not connect
2	**CAN_L**	**CAN Low Signal**
3	**CAN_GND**	**Signal ground**
4	Reserved	Do not connect
5	(CAN_SHLD)	Optional CAN shield
6	(GND)	Optional Signal ground
7	**CAN_H**	**CAN High Signal**
8	Reserved	Do not connect
9	(CAN_V+)	Optional external driver supply

NOTICE

For more information about connecting the CAN interface, please refer to the manual, *"Introduction to CANtrol Automation Systems".*

3. Digital Inputs/Outputs (high side-/low side switching)

Outputs may also be connected to inputs without additional external load.

3.1. Grouping of Inputs/Outputs

The grouping facility permits formation of groups, separate power circuits, emergency off circuits, etc. as and when required.
Inputs/outputs can be supplied in groups as
• 2 input groups and
• 4 output / input groups

The **modular electronic circuit** for C modules is supplied together with input group 2 (Group 2) over connection terminals 1 (L1+) and 2 (M1).
The modular electronic circuit must be supplied with power in **any** cases, otherwise the modules will be inoperable.
Supply must be provided directly (unswitched) from the supply unit.

Inputs

Inputs (sensors) must be supplied directly from the supply unit.
Do not conduct the sensor supply through switched circuits.

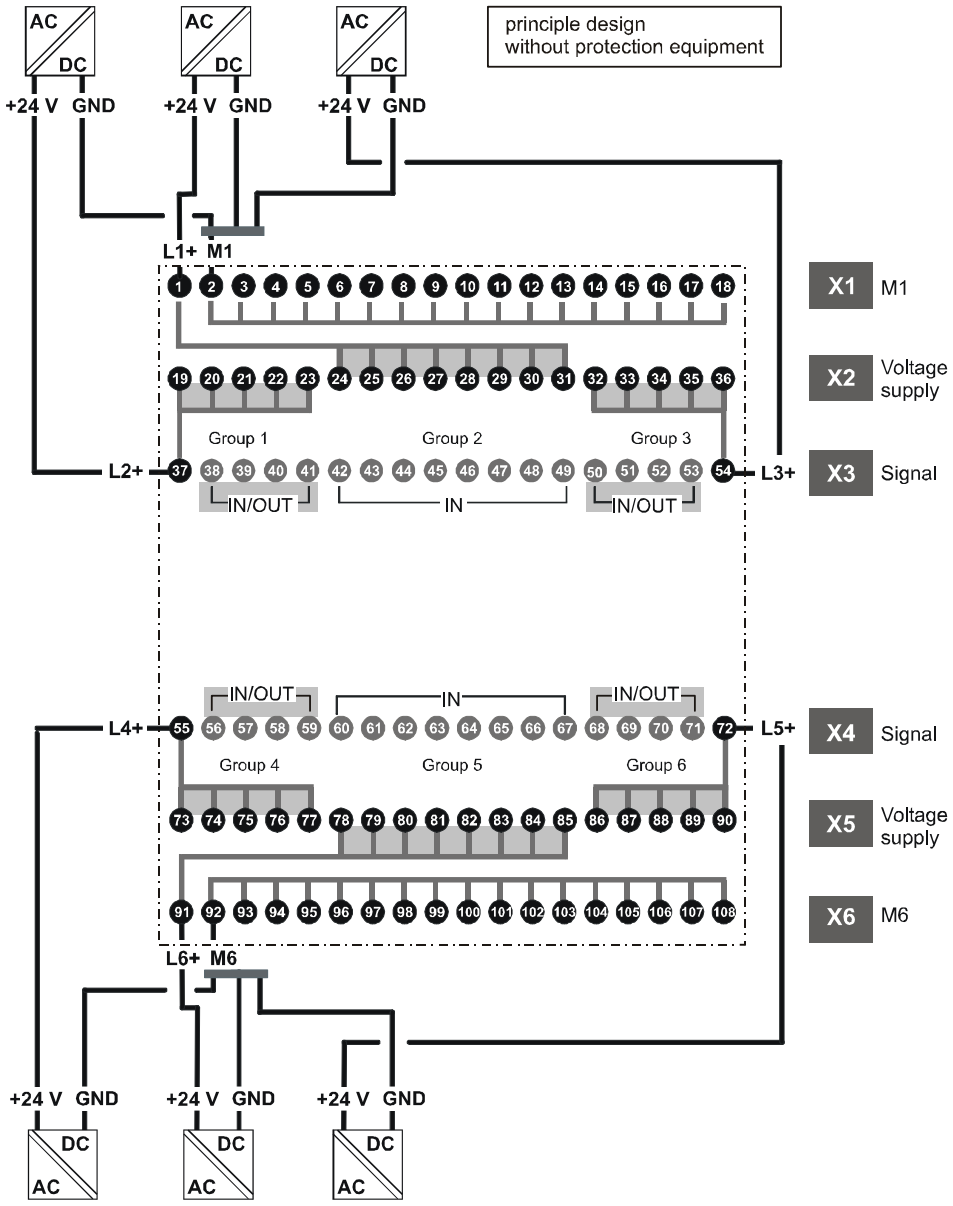
Outputs

Output groups may be supplied through upstream switch elements (emergency off, manual switches, etc.).

Feedback could destroy the module and/or the sensors!

Otherwise, when group power supply is disconnected, connected sensors could produce a feedback over the output transistors. Always make sure the sensors are each supplied from the same power source as the module's associated I/O group.

3.1.1. Schematic Diagram of Input/Output Grouping (high side-/low side switching)



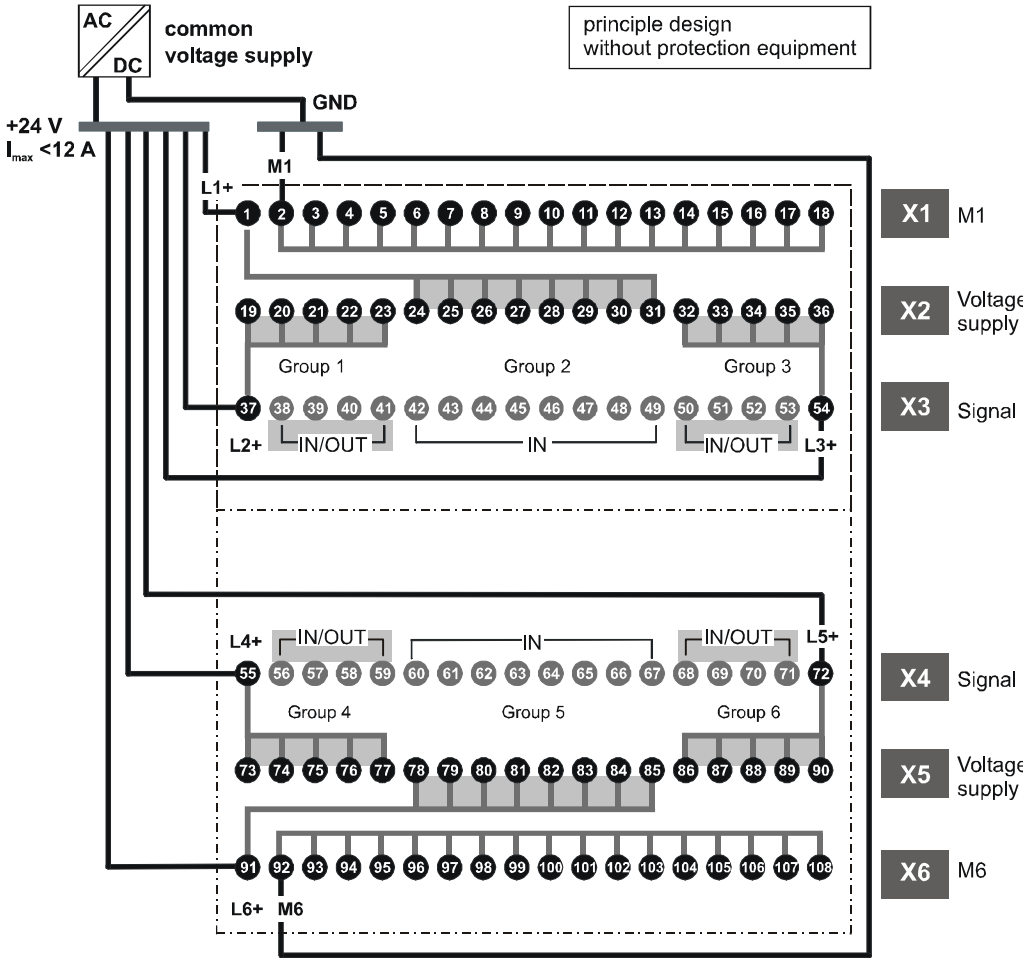
Group 1	IN / OUT 1-4	*Bemessungsspannung für erhöhte Isolation nach Rated voltage for increased isolation defined by* *EN 61131-2* *0...50 V*
Group 2	IN 5-12	
Group 3	IN / OUT 13-16	
Group 4	IN / OUT 17-20	
Group 5	IN 21-28	
Group 6	IN / OUT 29-32	

2VF100007DG00.cdr

3.1.2. Without Grouping (high side-/low side switching)

Wird auf die Gruppenbildung bei der Spannungsversorgung verzichtet, sind vom Anwender die im folgenden Bild dargestellten Verbindungen herzustellen.

Without grouping of the voltage supply, the user has to build the following connection.



2VF100008DG01.cdr

3.2. Digital Inputs, high side switching

The digital inputs are high side switching type 1 inputs for 3-conductor sensors. They are designed for input voltages of 24 V nominal. The inputs are transmitted cyclically to the CPU. An open input is interpreted as static 0 (LOW).

Pulse recognition and interference suppression

Inputs are read cyclically. Pulses < 100 µs are hardware suppressed. The sampling interval can be parameterised by software. The shortest possible sampling interval is 250 µs.

If pulses are to be detected reliably they must be longer than the sampling interval stipulated by software.
Multiple sampling can be programmed in order to suppress spurious pulses.
Sampling interval and multiple sampling (filtering) can be activated in groups of 32 inputs each.

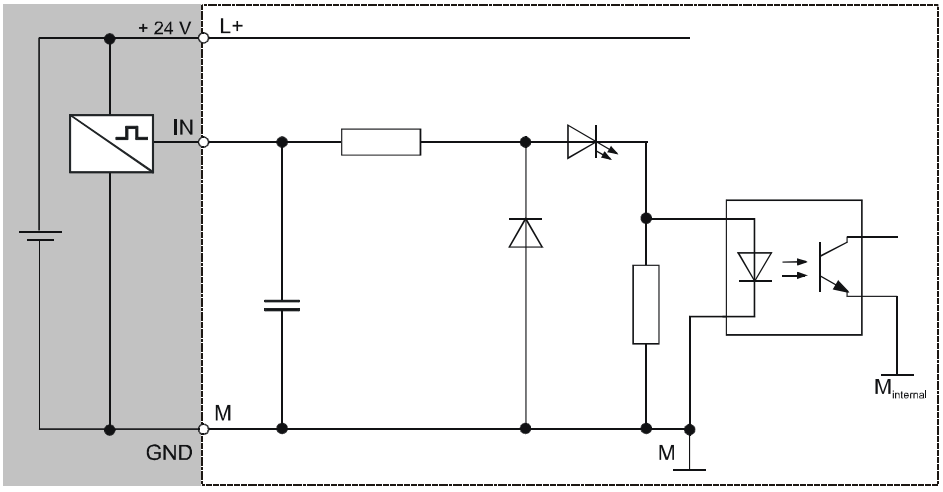
NOTICE

This function is available only for C applications at present. Using IEC 61131-3 the filter is permanently set to 250 µs.

Operating status

The status of each input is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals.
An LED lights when its associated input is activated (logical 1 / HIGH).

3.2.1. Block diagram of input, high side switching



2VF100009DG01.cdr

3.3. Digital Inputs, low side switching

The digital inputs are low side switching type 1 inputs for 3-conductor sensors. They are designed for input voltages of 24 V nominal. The inputs are transmitted cyclically to the CPU. An open input is interpreted as static 0 (LOW).

Pulse recognition and interference suppression

Inputs are read cyclically. Pulses < 100 µs are hardware suppressed. The sampling interval can be parameterised by software. The shortest possible sampling interval is 250 µs.

If pulses are to be detected reliably they must be longer than the sampling interval stipulated by software.
Multiple sampling can be programmed in order to suppress spurious pulses.
Sampling interval and multiple sampling (filtering) can be activated in groups of 32 inputs each.

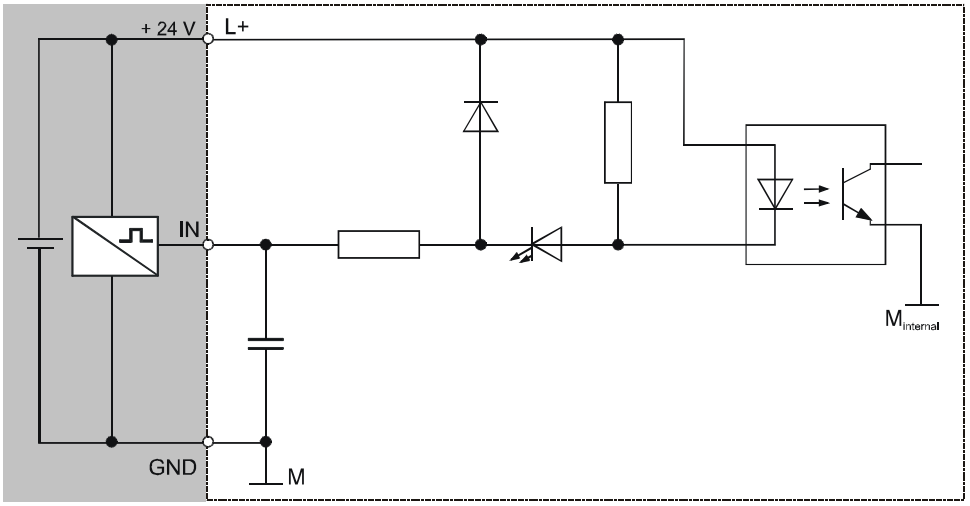
NOTICE

This function is available only for C applications at present. Using IEC 61131-3 the filter is permanently set to 250 µs.

Operating status

The status of each input is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals.
An LED lights when its associated input is activated (logical 0 / LOW).

3.3.1. Block diagram of input, low side switching

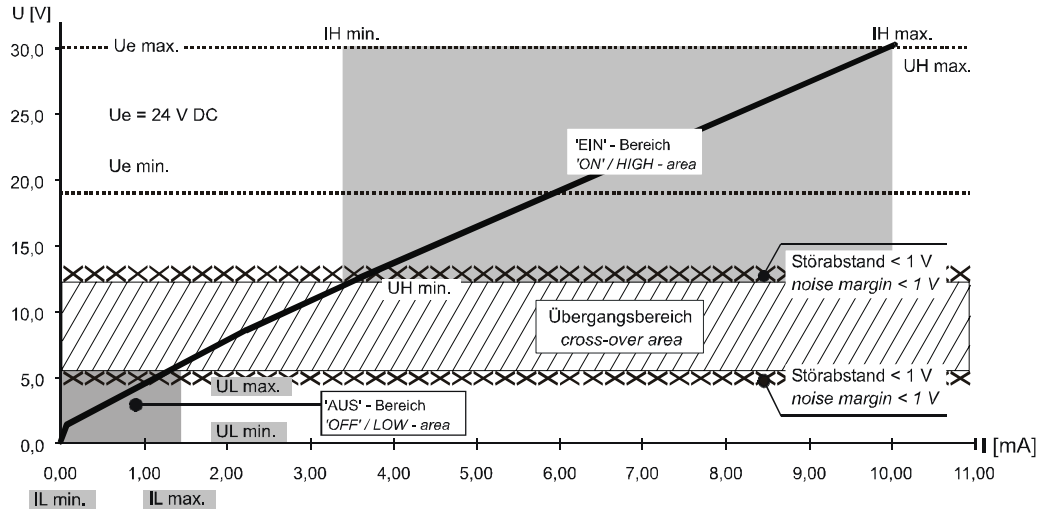


2VF100085DG00.cdr

3.3.2. Digital Inputs Data (high side-/low side switching)

Module data	
Number of inputs	16 (max. 32)
Line lengths: in switchgear cabinet dedicated l.v. wiring	 Allow for voltage drop when choosing conductor cross-section, otherwise no restrictions in practice. Observe all relevant local regulations and the requirements of EN 61131-3. Please consult manufacturer regarding lightning hazard
Rated load voltage L+ Reverse voltage protection	24 VDC (SELV) yes
Electrical isolation	yes (optical isolator) in groups
Status display	yes, yellow LED for each input
Alarms	definable according to software
Input delay	parameterisable by software
Input capacitance	< 10 nF

Digital-input operating areas (high side-/low side switching)



Eingangsspannung (DC) der externen Stromversorgung
Input voltage (DC) of extern power supply

Ue	24 V	Bemessungsspannung / *rated voltage*
Ue max.	30 V	oberer Grenzwert / upper *limit*
Ue min.	19,2 V	unterer Grenzwert / *lower limit*

Grenzwerte für '1' Signal für die 'EIN'-Bedingung
Limit for '1' signal for the 'ON'-condition

$UH_{max.}$	30,0 V	obere Spannungsgrenze / upper *voltage limit*
$IH_{max.}$	10,0 mA	obere Stromgrenze / upper *current limit*
$UH_{min.}$	13,5 V	untere Spannungsgrenze / *lower voltage limit*
$IH_{min.}$	3,5 mA	untere Stromgrenze / *lower current limit*

Grenzwerte für '0' Signal für die 'AUS'-Bedingung
Limit for '0' signal of the 'OUT'-condition

$UL_{max.}$	5,5 V	obere Spannungsgrenze / upper *voltage limit*
$IL_{max.}$	1,5 mA	obere Stromgrenze / upper *current limit*
$UL_{min.}$	0 V	untere Spannungsgrenze / *lower voltage limit*
$IL_{min.}$	0 mA	untere Stromgrenze / *lower current limit*

2VF100010DG00.cdr

3.4. Digital Outputs, high side switching

WARNING	The module can be destroyed by overvoltages > 32 V and / or feedback. Risk of **fire!**

Each digital output is also usable as an input. See description under ‘Digital Inputs’ if using as input.

Outputs

The outputs are of high side switching 24 volt type (two-conductor). Maximum output current per output is 500 mA. The outputs have a common earth (GND) when operating in groups. Power is supplied separately from the supply for the modular electronic circuit (see ‘Connection Assignment’).
The outputs switch automatically to ‘0’ (LOW) if there is no available data link to the CPU or if the module’s internal supply is insufficient.

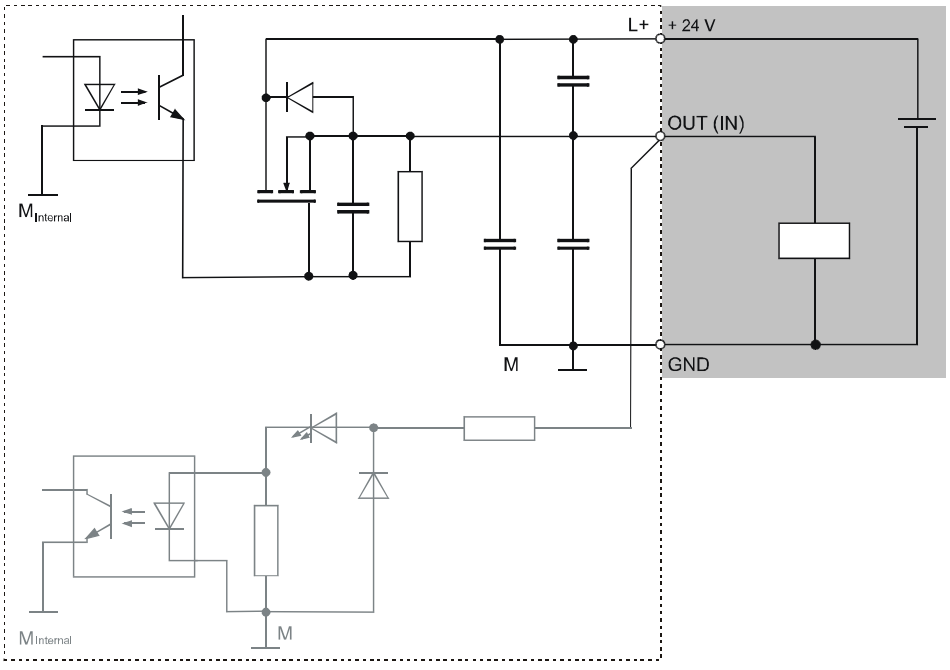
Protected output

All outputs are protected by an incorporated current-limiting circuit and a thermal overload protection circuit. If overloaded, the affected output switches off.
The output can be re-activated by program on elimination of the overload and thermal cooling. A high-speed de-excitation feature having a terminal voltage of 50 V, related to L+, protects all outputs against induced voltage peaks under inductive loads.
The overload protection of non-involved outputs may also respond prematurely if feedback or high-speed de-excitation give rise to thermal loads.

Operating status

The status of each output is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals. A LED lights when its associated output is activated, logical ‘1’ (HIGH).

3.4.1. Block diagram of output high side switching



2VF100011DG01.cdr

3.5. Digital Outputs, low side switching

WARNING	The module can be destroyed by overvoltages > 32 V and / or feedback. Risk of **fire!**

Each digital output is also usable as an input. See description under ‘Digital Inputs’ if using as input.

Outputs

The outputs are of low side switching 24 volt type (two-conductor). Maximum output current per output is 500 mA. The outputs have a common earth (GND) when operating in groups. Power is supplied separately from the supply for the modular electronic circuit (see ‘Connection Assignment’).
The outputs switch automatically to ‘1’ (HIGH) if there is no available data link to the CPU or if the module’s internal supply is insufficient.

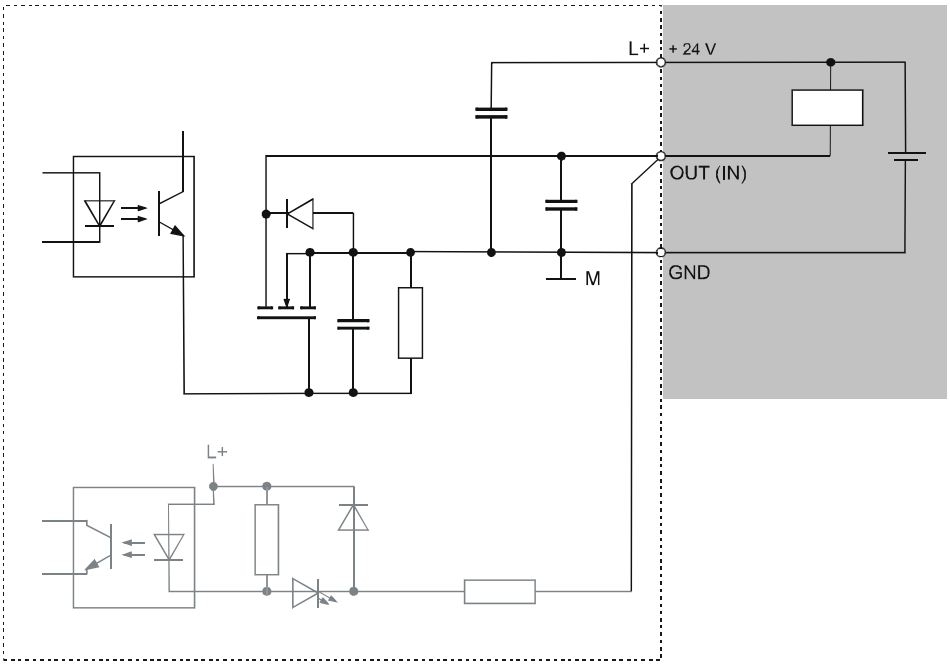
Protected output

All outputs are protected by an incorporated current-limiting circuit and a thermal overload protection circuit. If overloaded, the affected output switches off.
The output can be re-activated by program on elimination of the overload and thermal cooling.
The overload protection of non-involved outputs may also respond prematurely if feedback give rise to thermal loads.

Operating status

The status of each output is indicated by a yellow operating status LED on the front panel of the module. The LEDs are spatially assigned to the supply terminals. A LED lights when its associated output is activated, logical ‘0’ (LOW).

3.5.1. Block diagram of output low side switching



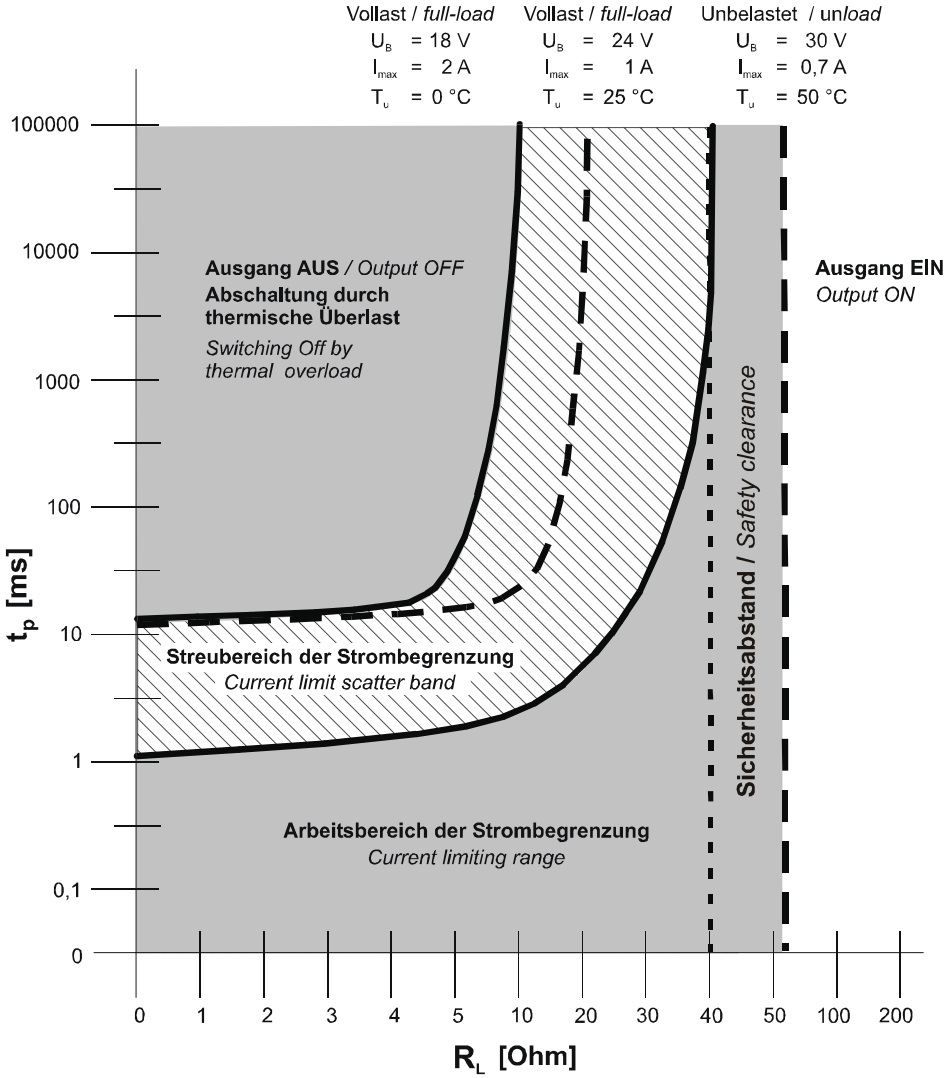
2VF100086DG00.cdr

3.5.2. Digital Outputs Data (high side-/low side switching)

Module data	
Number of outputs	16 semiconductor outputs in 4 groups
Type of outputs	semiconductor, non-holding
Suppressor circuit for inductive loads	high-speed de-excitation 50 V terminal voltage (typical) to + 24 V
Power loss due to de-excitation	max. 0.5 watts per output max. 4 watts per module
Status display	yes, yellow LED for each output
Diagnostic function	yes, switching state can be read back at pin
Load connection	
Total loading (100%)	8 A (16 x 0,5 A)
Overload protection	yes, in event of thermal overload Responding of thermal overload protection may influence adjoining outputs
Short-circuit protection [1)] response threshold	yes, electronic current-limiting feature, min. 0.5 A, typically 0.9 A
1) Current is limited electronically. Responding of the short-circuit protection feature produces thermal overload and trips the thermal overload protection circuit..	
Output delay for ‘0’ to ‘1’ for ‘1’ to ‘0’	 max. 0,5 ms max. 0,5 ms
Output capacitance	< 20 nF
Rated voltage	+24 VDC
Voltage drop (at rated current)	< 0,5 V
Rated current for ‘1’ signal	 0,5 A
Leakage current for ‘0’ signal	 max. 0,1 mA
Total current of all outputs	max. 8 A (16 x 0,5)
Total current per group (horizontal mounting on vertical mounting plate)	max. 2 A (4 x 0,5)
Lamp load (+24 VDC)	max. 6 watts
Connection of two outputs in parallel to provide logic operation to increase performance	 allowed not allowed
Insulation resistance	
Rated voltage	0 V <Ue <50 V
Test voltage up to 2,000 m altitude	500 VDC

Overload Reaction of Digital Outputs (high side-/low side switching)

Überlast-Verhalten der digitalen Ausgänge
Overload-reaction of digital output



Innerhalb des Streubereichs der Strombegrenzung ist das Verhalten der Strombegrenzung undefiniert.
Within the current-limit scatter band the reaction of current limiting is undefined.

2VF100021DG00.cdr

NOTICE

It is not possible to know for certain within the current limit scatter band whether the response will be to disconnect or to return to the working range.

As a result, this state should be avoided! The output is ready for operation by elimination of the overload and thermal cooling.

blank page

4. Annex

4.1. Environmental Protection

4.1.1. Emission

When used correctly, our modules do not produce any harmful emissions.

4.1.2. Disposal

At the end of their service life, modules may be returned to the manufacturer against payment of an all-inclusive charge to cover costs. The manufacturer will then arrange for the modules to be recycled.

4.2. Maintenance/Upkeep

⚠ WARNING	**Do not insert, apply, detach or touch connections while in operation – risk of destruction or malfunction.** Disconnect all incoming power supplies before working on our modules; this also applies to connected peripheral equipment such as externally powered sensors, programming devices, etc. All ventilation openings must always be kept free of any obstruction.

The modules are maintenance-free when used correctly.
Clean only with a dry, non-fluffing cloth.
Do not use detergents.

4.3. Repairs/Service

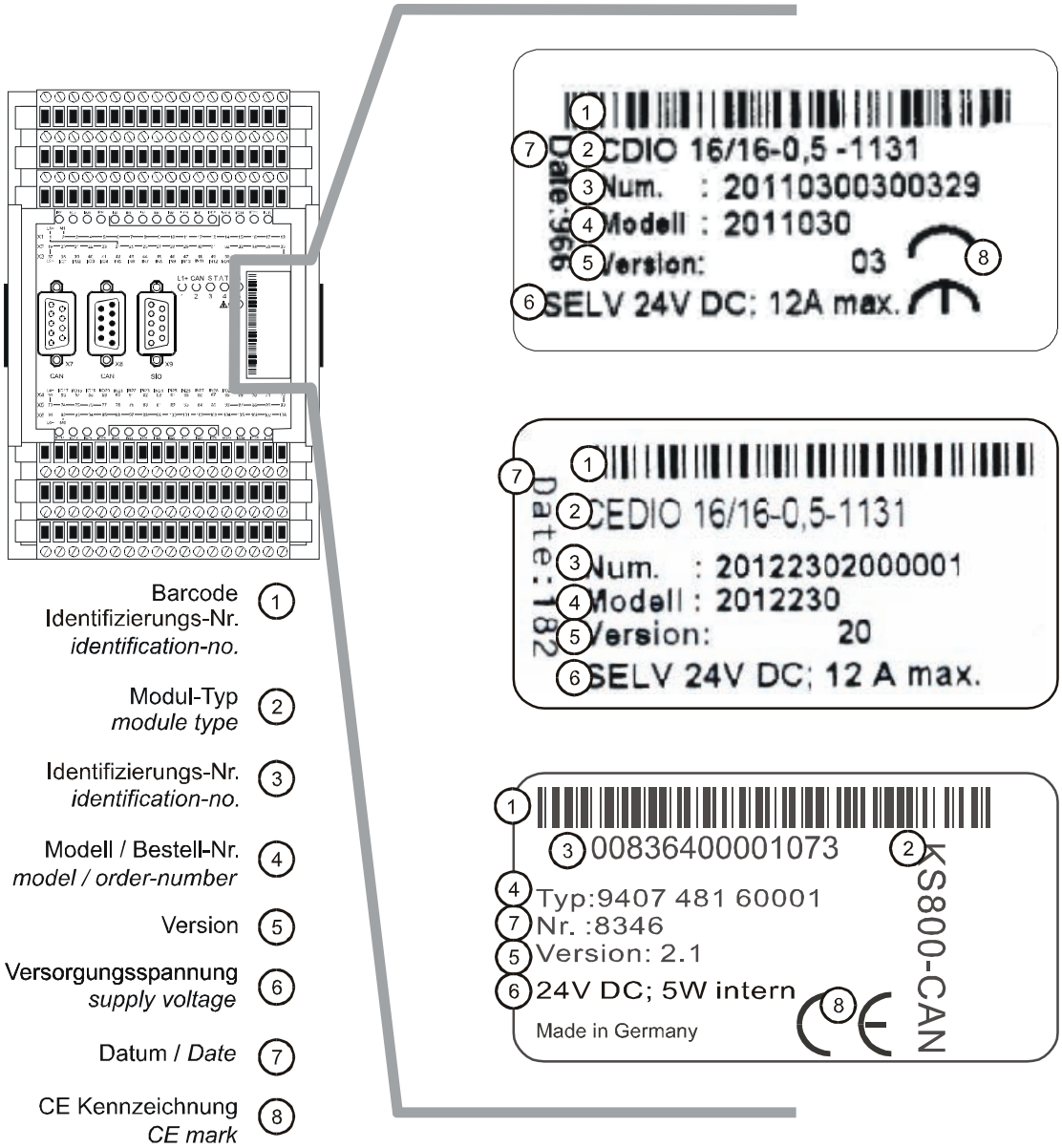
⚠ WARNING	Repair work may only be carried out by the manufacturer or its authorised service engineers.

4.3.1. Warranty

Sold under statutory warranty conditions. Warranty lapses in the event of unauthorised attempts to repair the equipment and/or product, or in the event of any other form of intervention.

4.4. Nameplate

Erklärungen zu den Typenschildern (Beispiel)
nameplate descriptions (example)



Barcode Identifizierungs-Nr. *identification-no.* 1

Modul-Typ *module type* 2

Identifizierungs-Nr. *identification-no.* 3

Modell / Bestell-Nr. *model / order-number* 4

Version 5

Versorgungsspannung *supply voltage* 6

Datum / *Date* 7

CE Kennzeichnung *CE mark* 8

2VF100080DG01.cdr

1 **Barcode**
same as identification number.

2 **Module type**
plain-text name of module.

3 **Identification no.**
module's identification number.

4 **Model/order no.**
You only need to give this number when ordering a module. The module will be supplied in its current hardware and software version.

5 **Version**
defines the design-level of the module as supplied ex-works.

6 **Supply voltage**

7 **Date**
internal code.

8 **CE mark**

NOTICE

The 'Version' (supply version) panel specifies the design-level of the module as supplied ex-works.

When replacing a module, users, with the CNW (CANtrol Node Wizard) tool, can read off the current software version of the newly supplied module, and then reload their 'own' software version for a particular project if necessary. With the latter in mind, before the download you should always keep a record of the existing software levels in your project documentation (software version, node IDs, baud rate, etc.).

4.5. Addresses and Bibliography

4.5.1. Addresses

CiA

'CAN in Automation', international manufacturers and users organisation for CAN users in the field of automation:

CiA - CAN in Automation e.V.
Am Weichselgarten 26
D-91058 Erlangen /Germany
e-mail: headquarters@can-cia.de
http://www.can-cia.de

DIN-EN Standards

Beuth Verlag GmbH
10772 Berlin

or

VDE-Verlag GmbH
10625 Berlin

IEC Standards

VDE Verlag GmbH
10625 Berlin

or

Internet search
http://www.iec.ch/

4.5.2. Standards/Bibliography

IEC61131-1/EN61131-1	Programmable controllers Part 1: General information
IEC61131-2/EN61131-2	Programmable controllers Part 2: Equipment requirements and tests
IEC61131-3/EN61131-3	Programmable controllers Part 3: Programming languages
IEC61131-4/EN61131Bl1	Programmable logic controllers Supplementary Sheet 1: User guidelines
EN 50081 Parts 1+2	German EMC Act: Emitted interference
EN 50082 Parts 1+2	German EMC Act: Noise immunity
ISO/DIS 11898	Draft International Standard: Road vehicles - Interchange of digital information - **C**ontroller **A**rea **N**etwork (CAN) for high-speed communication
EN 954-1	Safety of machinery: Safety-related parts of control systems (Part 1)
Bibliography	A variety of specialist publications on the CANbus is available from specialist bookshops, or can be obtained through the CiA users' organisation.

NOTICE

Our Technical Support team will be glad to provide other literature references on request.